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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/680,036	10/05/2000	Richard A. Mann	09785980-0021	9051

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EXAMINER

KANG, DONGHEE

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 07/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/680,036

Applicant(s)

RICHARD A. MANN ET AL.

Examiner

Donghee Kang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on April 16, 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I (claims 1-18) in Paper No. 4 is acknowledged.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims **7, 9, & 11** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Referring to claims **7, 9, & 11**: claims recite the limitation of "... the material is at least 20 percent greater than a process minimum" in lines 1-2 of the claims. The scope of what is being in the term "a process minimum" is unclear. What is meant by the limitation "a process minimum"?

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims **1-6, 8, & 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Berezin (US 6,388,243) in view of Noguchi (US 4,841,346).

Regarding claims **1, 5, & 17-18**, Berezin teaches a sensor having a transistor, comprising (Fig.3A):

a material (p-type substrate) between a floating diffusion region (205) and a diffusion region (208) beneath the gate (206) having a predetermined length; a detection device (photo diode, 200) coupled to the floating diffusion region by a signal path, wherein the material allows the detection device to be reset to a predetermined state, wherein the half of the material is closest the detection device. See also Col.3, line 21 – Col.4, line 63.

Berezin does not teach a gate located partially over a source and partially over a drain. However, it is well known in the art and also taught by Noguchi forming the gate electrode (6) partially over a source and partially over a drain (Fig.2). Therefore, it would have been obvious in the art at the time the invention was made to incorporate the teaching of Noguchi into Berezin's device, since if the gate does not extend to the source and drain diffusion, an incomplete channel will be formed and the device will not operate properly. To avoid this possibility, the standard gate electrode processing calls for some overlap of the gate past the source and drain edges.

Regarding claim **2**, Berezin teaches substantially the entire claimed structure, as applied to claim 1 explained above, except for an implant region formed in the material that increases a surface threshold of the transistor. However, it is well known in the art that the most valuable tool for controlling threshold voltage is ion implantation and also taught by Noguchi the implant region 7 formed in the channel region of transistor (Fig.2). Thus, it would have been obvious in the art at the time the invention was made

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to incorporate the teaching of Noguchi into the Berezin's device in order to increase the threshold voltage. Since the threshold voltage determines the requirements for turning the MOS transistor on or off, it is very important to be able to adjust threshold voltage in designing the device.

Regarding claim 3, neither Berezin nor Noguchi teaches the surface threshold of the transistor is increased to at least 0.8 volts. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary a threshold voltage in transistor using ion implantation, since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art. In re Aller, 105 USPQ 233.

Regarding claim 4, neither Berezin nor Noguchi teaches the implant is in approximately a half of the length of the material.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select a length of implant, since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art.

Regarding claim 6, neither Berezin nor Noguchi teaches the implant is boron. It is well known in the art to use boron when p-type implants are required. Thus, it would have been obvious in the art at the time the invention was made to use boron in the implant step since it is a known material well suited for the intended purpose.

Regarding claim 8, neither Berezin nor Noguchi teaches the diffusion region is formed by a phosphorous implant. It is well known in the art to use phosphorous when

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n-type implants are required. Thus, it would have been obvious in the art at the time the invention was made to use phosphorous in the implant step since it is a known material well suited for the intended purpose.

6. Claims **10 & 12-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Berezin in view of Noguchi, as applied to claim 1 above, and further in view of Fratin et al. (US 5,977,591).

Regarding claims **10 & 12-13**, neither Berezin nor Noguchi teaches the gate is divided into a p-type region and an n-type region. However, Fratin teaches in Fig.1 the gate (8) is divided into a p-type (14) and an n-type (13). Therefore, it would have been obvious in the art at the time the invention was made to incorporate the teaching of Fratin into Berezin's device as modified by Noguchi in order to create shallow extensions to the active regions. Such modification would provide Berezin with tapering the electric field in border areas between the channel and the source/drain regions.

Regarding claim **14**, no prior arts teach the diffusion region is formed by a phosphorous implant. It is well known in the art to use phosphorous when n-type implants are required. Thus, it would have been obvious in the art at the time the invention was made to use phosphorous in the implant step since it is a known material well suited for the intended purpose.

Regarding claims **15-16**, neither Berezin nor Noguchi teaches an implant region, which is formed by a boron implant located in the drain extending under the p-type region of the gate. However, Fratin teaches in Fig.1 the implant region 5 located in the

drain extending under the p-type region of the gate. Thus, it would have been obvious in the art at the time the invention was made to combine the teaching of Fratin with Berezin's device as modified by Noguchi in order to achieve high breakdown voltages.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lee et al. (US 5,904,493)

Zhao et al. (US 6,339,248).

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

DHK
July 11, 2002

